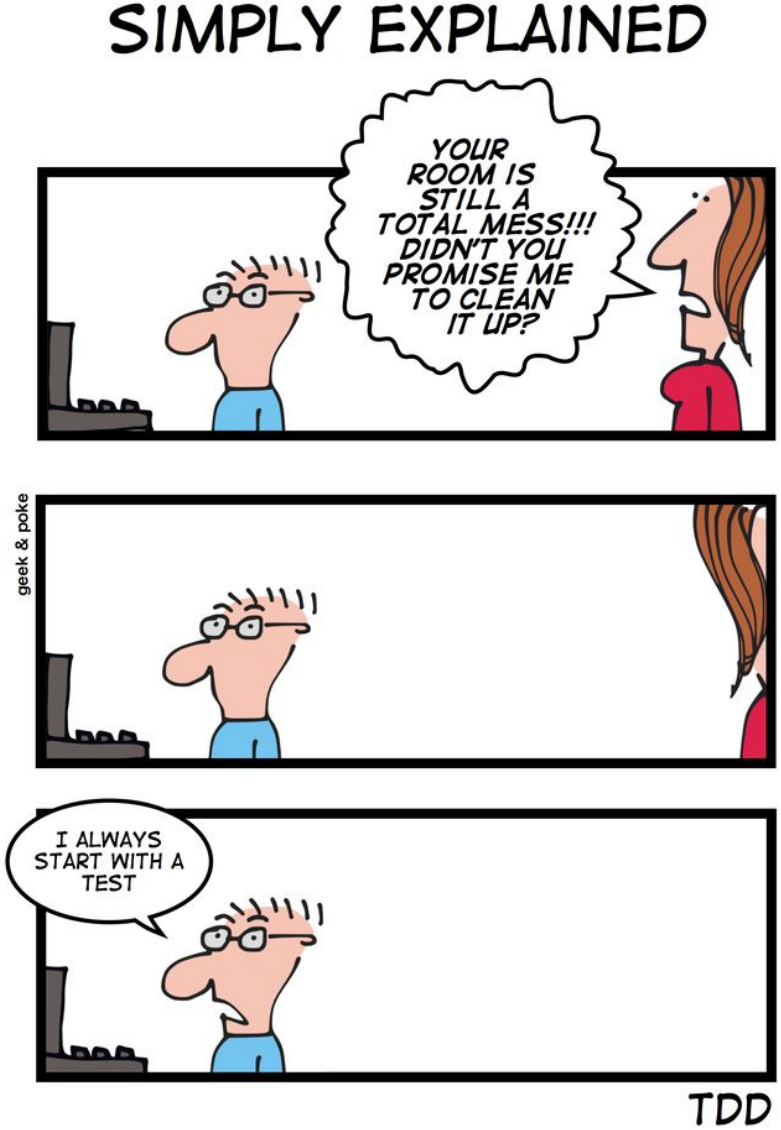

SIMPLY EXPLAINED
YOUR ROOM IS STILL A TOTAL MESS!!! DIDN'T YOU PROMISE ME TO CLEAN IT UP?
geek & poke
I ALWAYS START WITH A TEST
TDD

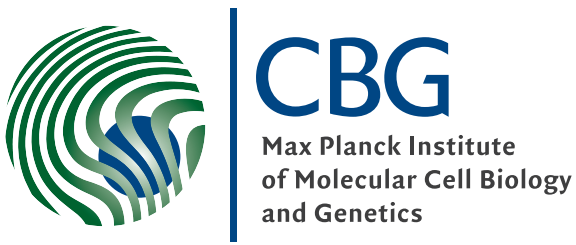
Unit Tests and Test-Driven Development

- An Introduction -

Peter Steinbach

Scionics Computer Innovations GmbH

October 8th, 2011



Outline

Unit Testing

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Definition

A method by which individual units of source code are tested to determine if they are fit for use. A unit is the smallest testable part of an application. (from [2])

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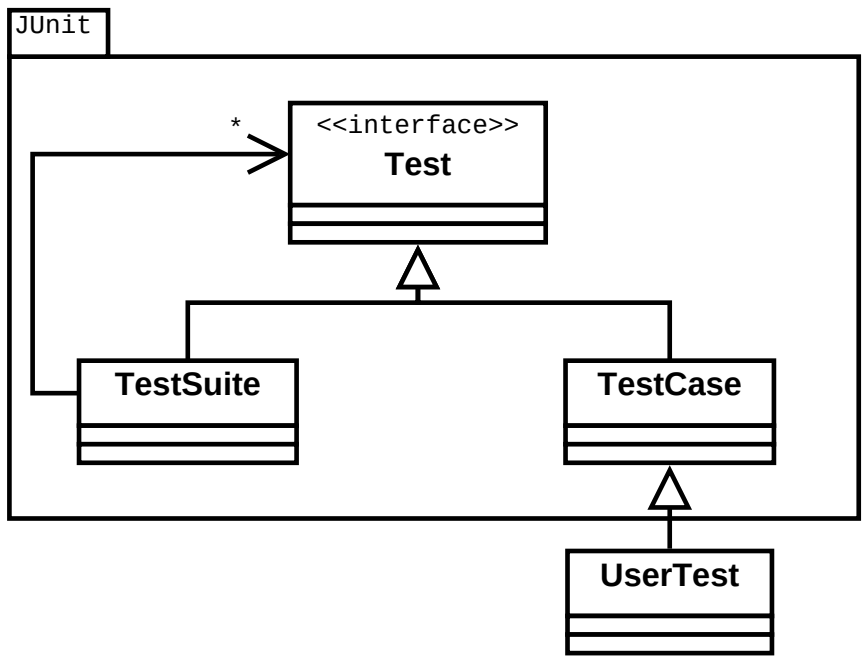
Where did it come from?

- `JUnit` first unit test framework in java (written by Kent Beck and Erich Gamma)
- since then, many ports to other languages written (see [4] and [1])
- provides unified interface and clean environment
- for `C++`, I prefer boost's unified testing framework [3]
- for `python`, I plainly use the `unittest` module [5]

How does it work?



Unit Testing: An Example : The MagVector class

Design Goals

- class containing a set of floats (in view of an algebraic vector)

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Let's have a look at the implementation of the **MagVector class and its tests** on your exercise sheets!

Unit Testing: Take-Home Messages

What to test?

1. contract of a class (its requirements and responsibilities)

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2. how exceptions/errors are handled (corner cases)

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Essentials about unit testing

- important that tests run/compile quick and immediately
- provides **fast** feedback to developer
- good IDEs have plugins that make testing very easy

Testing in Software Development

Testing in Software Development: Where Unit Tests are used

Tests are conducted on the unit, module or system level usually by dedicated Test or Q&A Engineers!

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- code is not executed
- code metrics, code reviews

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- software internals are analysed
- execution paths are checked

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- client perspective to software (internals assumed unknown)
- valid/invalid inputs given

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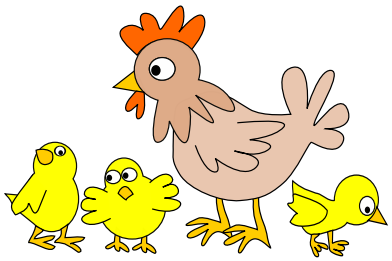
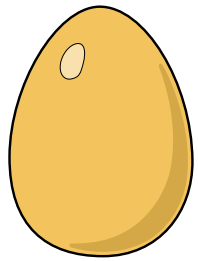
Testing in Software Development: Most Common Applications to Unit Tests





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A-Priori Tests

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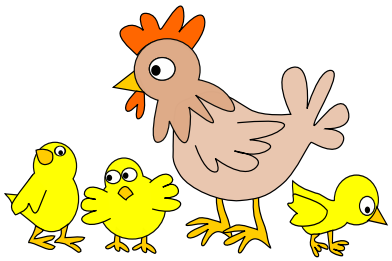

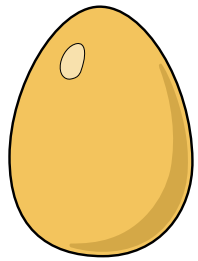

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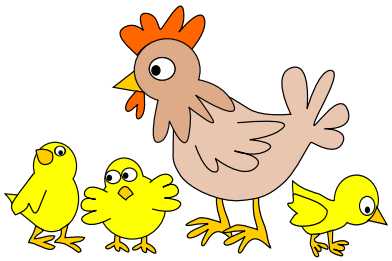

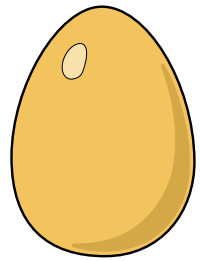

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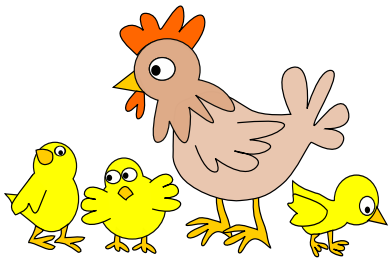

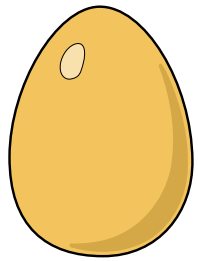

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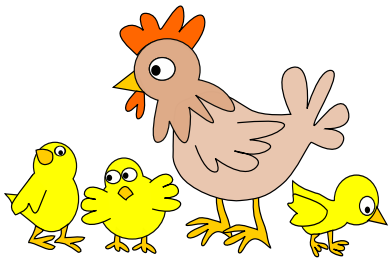

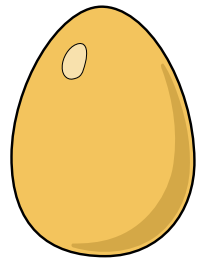

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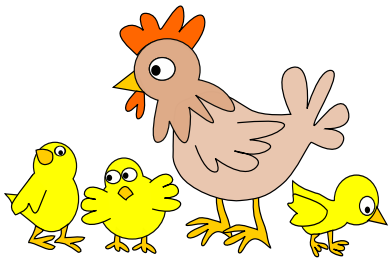

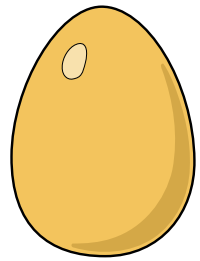

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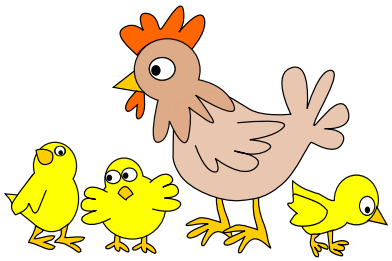

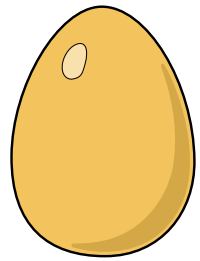

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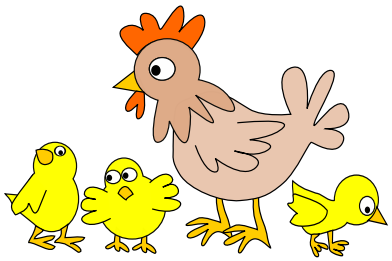

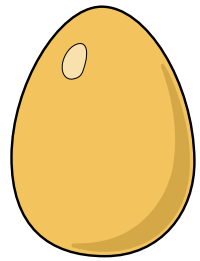

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Hen-and-egg discussion going on, [8, 9, 10].

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- **Yes**, before one codes a package, one should sit down with pen and paper
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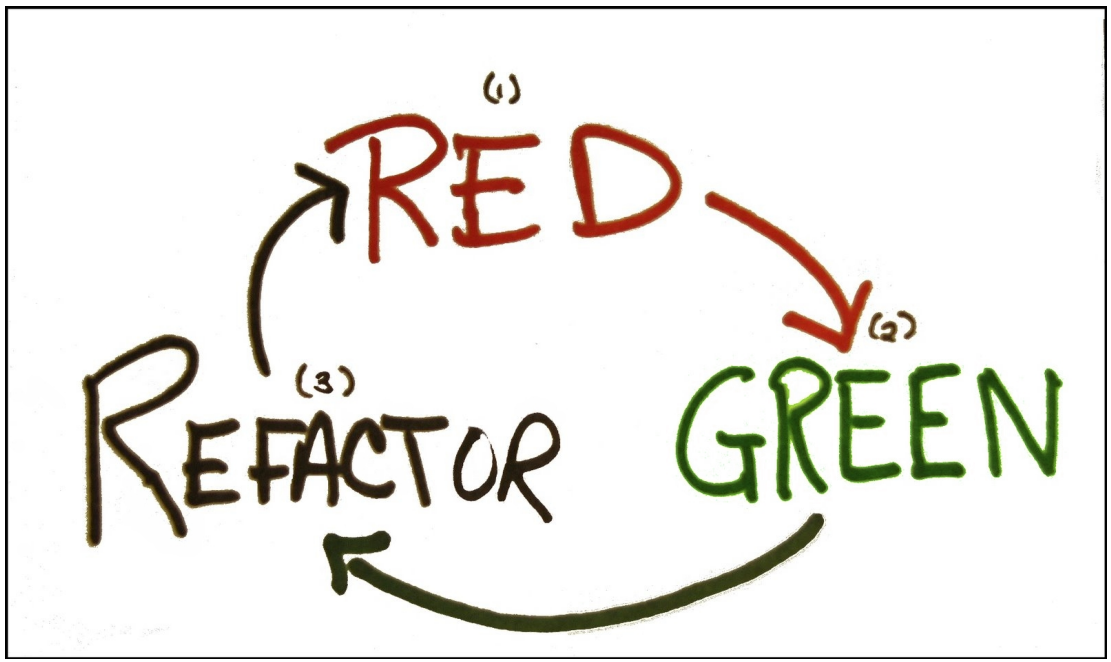
  ‘‘Why in the world did I ever write such crap?’’
- upgrade legacy code
  ‘‘Ahh, and here is the code of your predecessor. You can use it as a starting point!’’

Test-Driven Development: How TDD works



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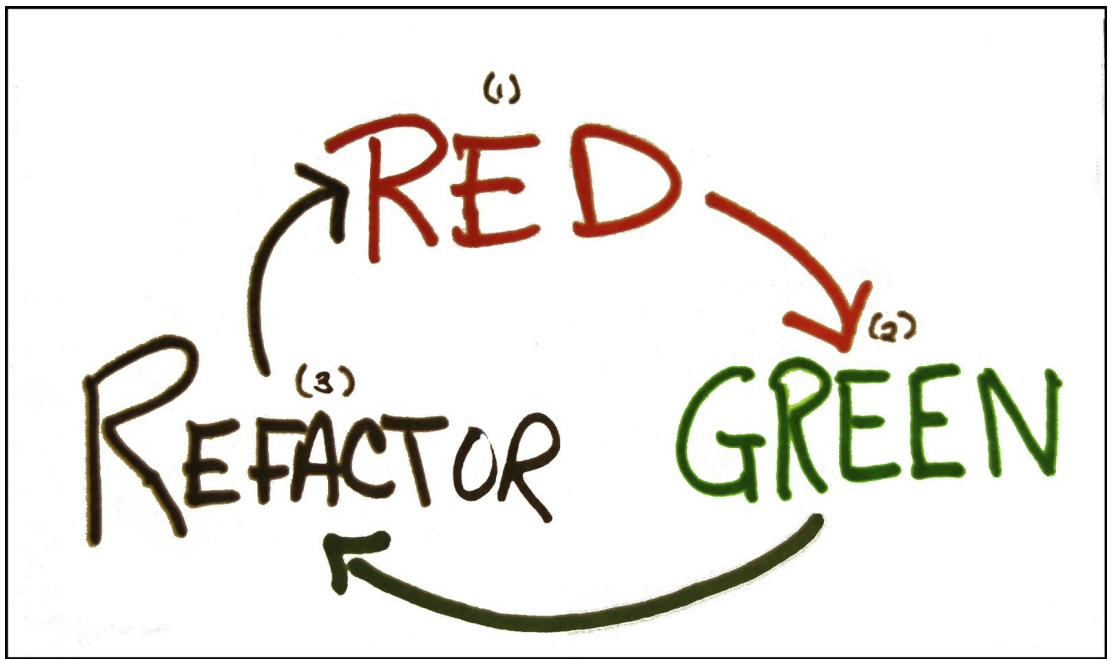

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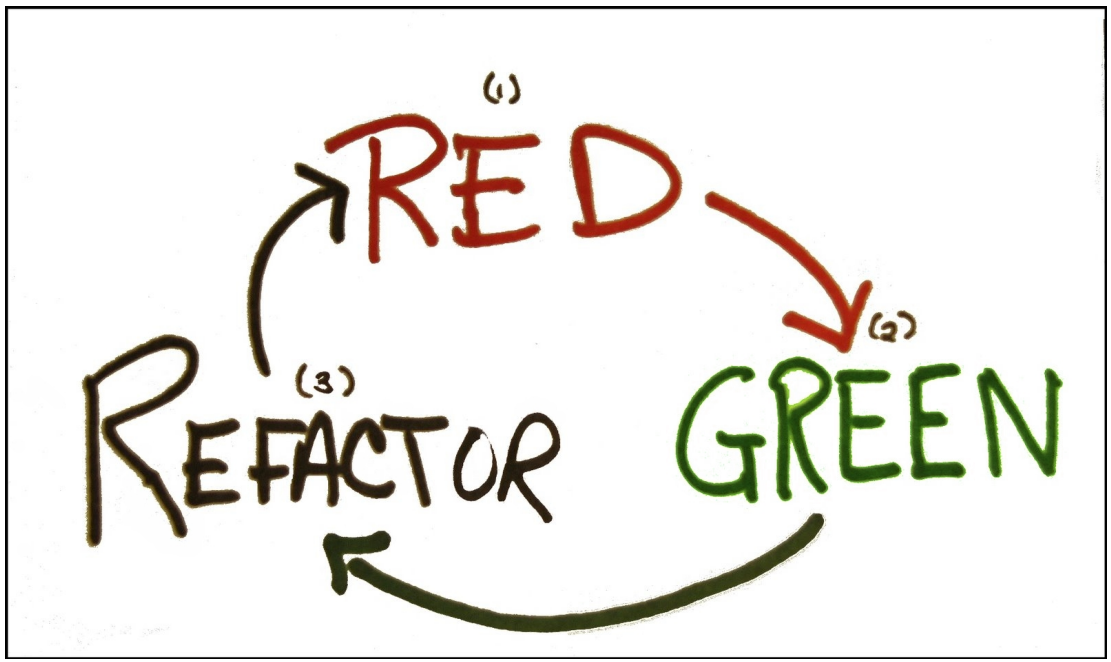

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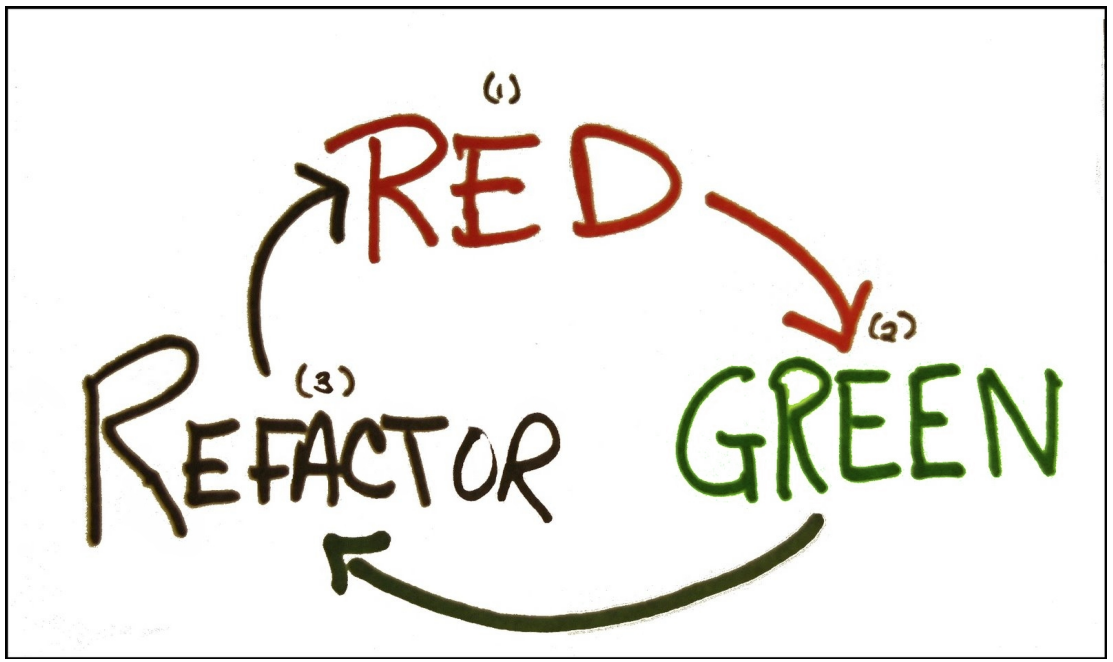

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Background

- agile development technique [6]
- formulated by Kent Beck in 2002 ([7])
- enforces simple design, testability and treats bugs before they happen

Test-Driven Development: Demonstrate TDD

A Demonstration Might Save a 1000 Words!

Adding different norms to `MagVector`!

Test-Driven Development: What it may provide

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  (less bugs)

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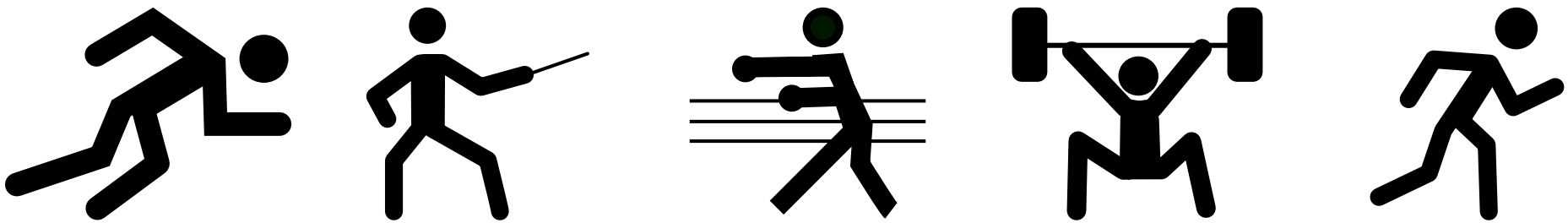
- Better unit test coverage
- Tests are less likely to be dropped
- no extra code
  (code the minimum required)

Test-Driven Development: Bottom Line for Every-Day Coding



Try it out! Practise is essential!

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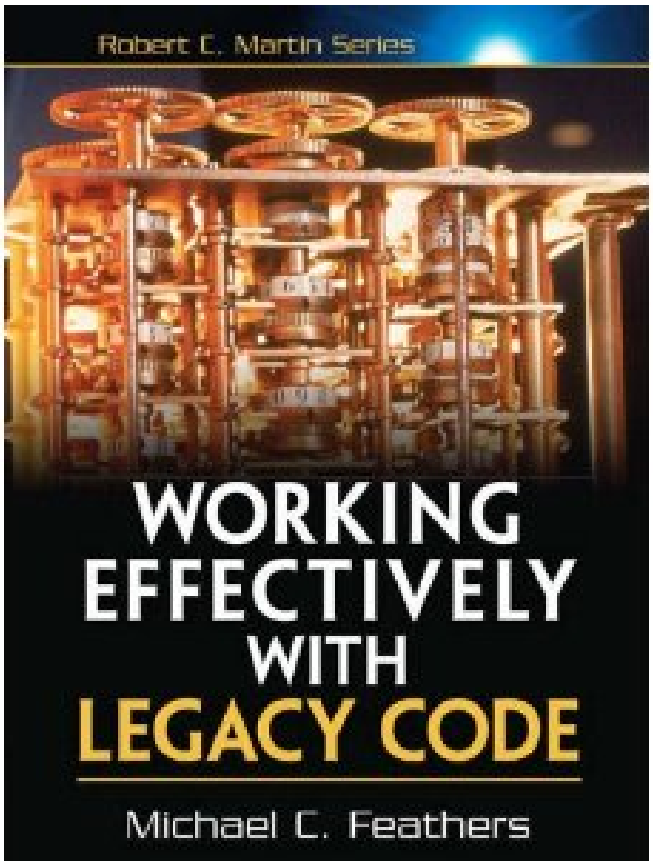
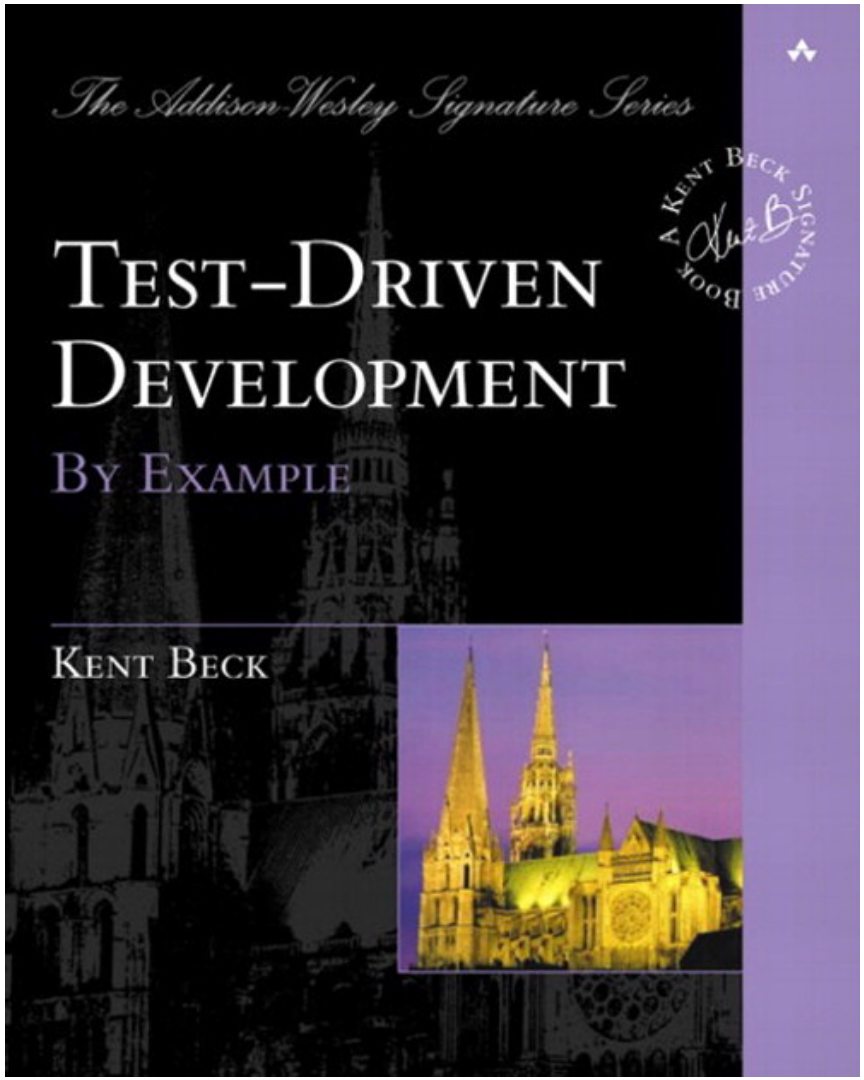
Try *TDD* to see yourself!

Thank you for your attention!

Literature



[11]



[7]

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